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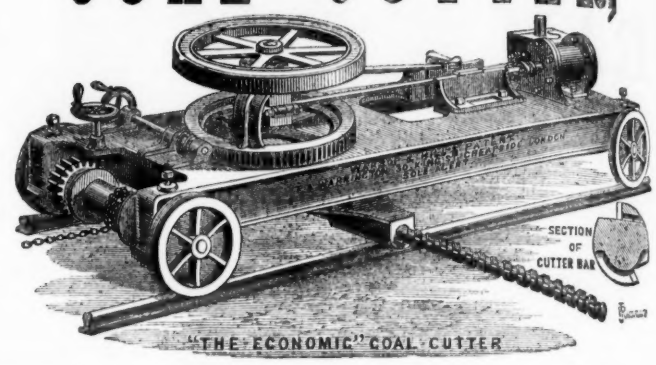

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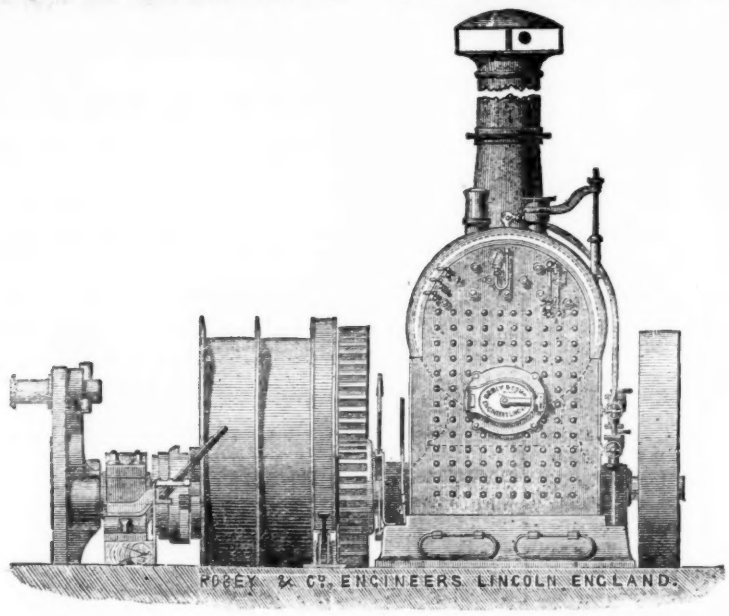

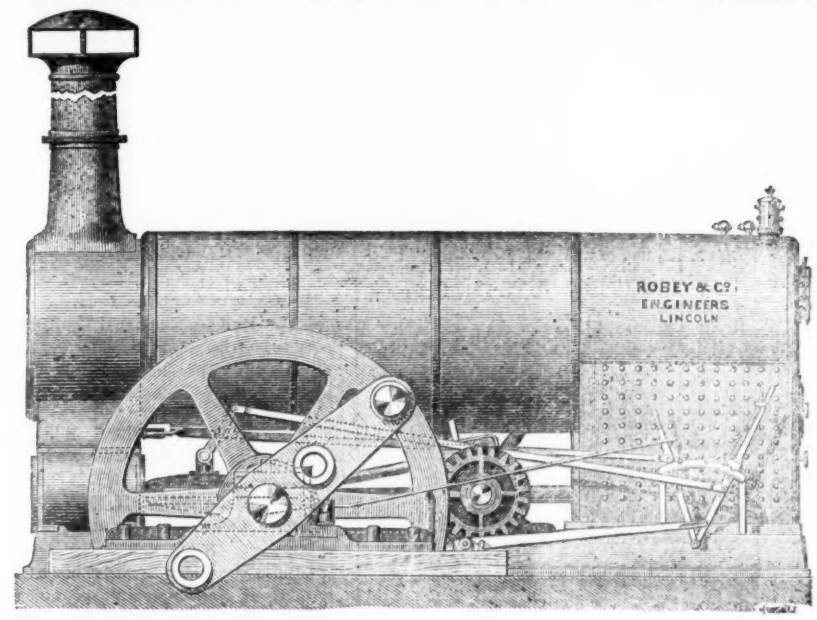

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Original Correspondence.

THE MINERAL RESOURCES OF WEST VIRGINIA.

SIR,—Will you kindly allow me space in your valuable Journal for a few remarks on the mineral wealth and other resources of West Virginia? I came here some time since, and have seen a great deal of this region. The richness of the coal deposits in this district in the varieties of bituminous, splint, and cannel are unrivalled.

The coal measures of this State cover nearly 16,000 square miles. In the New River, and Kanawha Valley, the coal beds make their appearance at the surface, to the number of 14 distinct strata, with an aggregate thickness at places of 100 ft., of which more than half is in workable beds of from 3 to 8 ft. in thickness. By the erasion of the streams the coal seams crop out on the hill sides high above the water and railway levels, in most favourable positions for easy, cheap, and safe excavation. The cost of opening mines is small, and as the ventilation and drainage are natural the cost of bringing coal to the surface must always be cheaper than in any other coal field in the world. Of the bituminous there are seams of different degrees of hardness, from the friable, or "fatty," to the harder block coals with regular cleavage, similar to that so largely in demand in the Western and Southern cities.

The splint coal of the Kanawha is a hard, close-grained, dry burning variety peculiar to this region, and is usually found here in conjunction with the seams of bituminous or cannel. It is remarkable for its great purity and freeness from sulphur and earthy matter. It also has great strength in the furnace stack, which makes it more valuable for the manufacture of iron than any other mineral fuel, since it can be used in its raw state without coking. The cannel is found in great abundance at different points throughout this valley, in seams from 2½ to 8 ft. thick. It is equal to the best imported cannel for use in the manufacture of gas, and wherever it becomes known will be in increasing demand for this purpose and for fuel. The average yield of this coal, as an oil-producing medium, is equal to about 75 gallons per ton.

In those heavy substantial raw materials, such as coal, salt, iron, and timber—solid foundations on which nations build their wealth and prosperity—this valley cannot be excelled. There is not another known coal field in the world with 50 to 60 ft. of workable coal in horizontal seams in the same hills and above water level. They are accessible, too, by river and railway to the largest markets of the country east and west, and containing cannel, splint, and bituminous coal, gas coal, coking coal, steam coal, grate coal, &c., each and all of a superior quality. Prof. Lesley, whose word stands high, speaking of the iron ores of the coal measures, in his *United States Railway and Mining Register*, says, "The iron ores of the coal measures form a class by themselves. The English name for them (clay ironstone) very well expresses their character. They are, in fact, beds of hardened mud charged with iron. The clay ironstone of the coal measures is one of the most valuable of all the iron ores, and those properties which are in possession of the exceptionally good exhibitions of this kind of ore can hardly be said to have a money valuation. First, from the rarity of such property. Secondly, from the situation of such a property, for its hills containing ore cannot fail to contain beds of good coal and limestone; and, thirdly, for the nature of this class of ores, they are the easiest of all to smelt." If iron can be made anywhere at a profit it can be made here, where there is such an unusual concentration of the materials which enter into its manufacture.

Blackband iron ore of superior quality has also been discovered in different localities. The ore has been analysed by experts, and found to contain in its crude state 33 per cent. of iron, and when roasted 65 per cent. of iron. The cost of production is from 3*l.* to 4*l.* per ton in this region. Besides all this there are the varieties of the limestone, sandstone, building stone, fire-clay, brines, salt, &c. There is probably no part of the United States having such immense and valuable forest of timber as that lying between the Allegahany mountains and the Ohio river, covering the limits of West Virginia. The timber is remarkable for its size, length, and quality. The suitability of this state for English agriculturists is undeniable. The land is richer than in England, and the climate better. Land can be bought for little more than one year's rent in England, mineral rights included. Every crop that will grow there can be cultivated here, and some especial ones besides. There are as good markets, and every necessary can be obtained at a lower price. All that an English farmer wants, in fact, is a little capital to start with, and he cannot fail of succeeding here. These lands, so rich in mineral deposits, and so valuable for agricultural purposes, can be purchased at present for prices ranging from 1*l.* to 4*l.* per acre.

I intend from time to time to write more especially on particular localities, and bring before the public the riches of different parts of this State, and I shall speak from my own knowledge, not from hearsay. I trust these lines may interest some who have not before thought of this exceedingly rich and lovely State.

PHILIP H. SYMONS, C.M.E.

Charleston, Kanawha County, W Va., U.S., March 28.

EXCHEQUER GOLD AND SILVER MINING COMPANY.

SIR,—The report of the remarks I made at the general meeting of shareholders of the above company, held on the 11th inst., omits at least two important points referred to by me, and to some extent misrepresents what I said. This may be partly due to my having expressed myself imperfectly. I also made some omissions and mistakes. I beg you, therefore, to allow me to supplement and correct your report.

There is evidently some *very* "good pay ore" in different parts of the workings, but as to there being such "in every run," there is so little in the "tunnel" and in the "100 ft. level" that I doubt whether more than a few score of tons of ore, averaging (say) $50 to the ton, could be got out of either place, and the manager—Mr. Chalmers—is of much the same opinion. Twenty tons a day for 250 days (not 300, as I said) of ore averaging 95*l.* a ton would certainly give, after deducting 5*l.* a ton for all working expenses, 450,000*l.* a year clear profit. *But*, 95*l.* is not a fair average of even our best stoping ground, as yet opened out. It is the mean of five *picked* specimens. "No. 1" is admitted to be "a little better than an average *of the face*," and "No. 3" is marked as "not *very* carefully selected" (the italics mine), distinctly implying that it was *more or less* carefully selected. The others are not stated to be taken at random, and, judging from experience, we may safely assume that they were all picked.

What we know is so vague, and mines of this class are so uncertain, that it is impossible to state an estimate except in the same sort of way as you would state a horse's chance in a race. I think, then, that it is about even betting that the stoping ground now opened out contains about 5000 tons of ore of the average net value, after making every deduction for working expenses, discount, &c., of 10*l.* a ton, and at least as likely to be over as under that value, and that at least as much more of equal value is within immediate reach. With 20 stamps this would take just two years of 250 days to work, and would return us 50 per cent. per annum on our share capital. I think, further, that the odds are in favour of our opening out still better ground in that time, and getting ten times our capital in the next ten years—*i.e.*, 100 per cent. per annum. But the latest indications are so promising, and the possibilities of mines of this class so nearly unlimited, that I think it is not more than 10 to 1 against our present stoping grounds returning us five times our capital within a year, and our getting 100 times our capital in the next ten years.

I, therefore, said that "after making every possible deduction" for what I considered the exaggeration in fixing the average at 95*l.*, and for the uncertainties of mining enterprises, our shares were worth more than their market price. But I added that it would not be fair of me to make the above statements in public without adding that I was at the time offering a limited number of my shares for sale at a fraction above the market price, my reason for selling being that, having invested very largely with the company when they were in difficulties, and having since lost large sums in other concerns, I had got too many of my remaining eggs in this one basket.

Assuming that the remarks in another part of the Journal about "an engineer (who became a large shareholder after having inspected the mine)" refer to me, I may state that I owned 5400 shares, or their equivalents, in exchangeable debentures, &c., before I visited the mine, and that I subsequently took 1790 more besides my fee and expenses, which were also paid in shares. My estimate, as stated at the meeting, was based on my inspection, coupled with Mr. Chalmers's subsequent discoveries, and not on my inspection alone. I regret that I omitted to bear my testimony to the inestimable qualities of our manager, Mr. Lewis Chalmers. Having lived more than four weeks with him, almost incessantly in his company, I am peculiarly in a position to do so. His faith in and devotion to the mine is sufficiently proved by his having lived for seven years in exile, cut off from civilisation, from his family and friends, the society of his equals, and everything but the bare necessaries of life; drawing only so much of his modest salary as was absolutely required to maintain himself there, and his children at home; sometimes making himself personally responsible for the debts of the company, and in various other ways. His indomitable energy and untiring industry I witnessed. His ability in almost every department of his multifarious labours was, so far as I could judge, extraordinary, and has on several occasions been successfully tested. I believe that not one man in a thousand would or could have done what he has done for the company. ALGERNON JOY, M.I.C.E.

Junior United Service Club, April 18.

JAVALI COMPANY.

SIR,—I notice in the report from this mine, published in last week's Journal, that only 368 tons of quartz were crushed, the balance of 1032 tons being made up of manta (a surface deposit). The report gives no explanation why the month's work was principally on manta. Surely it cannot be that the quartz is getting exhausted, as we have hitherto been informed that the supply was practically inexhaustible. Perhaps some of your valued correspondents, who have so many times sounded the praises of the Javali, will give us some information as to the real state of the mine, so far as the reserves of quartz and manta are concerned. I am sure the shareholders and readers of the Journal would feel grateful to the directors if they would publish more copious extracts from Capt. Sohn's monthly report, instead of the meagre account we generally get, sometimes occupying half-a-dozen lines. ENQUIRER.

EARLY DISCOVERY OF GOLD IN CALIFORNIA.

SIR,—In connection with Mr. George Henwood's interesting extract from the Voyage of Capt. George Shelvocke, R.N., published in 1726, and cited in the Journal of March 11, the following quotation from an address on the History of California, from the discovery of the country to the year 1849, delivered before the Society of California Pioneers, Sept. 10, 1869, by Mr. EDMUND RANDOLPH (*vide* page 271 "Mineral Resources of the United States, 1867," by Special Commissioner J. Ross Browne*) implies a still earlier discovery.

In 1578, at midsummer, Sir Francis Drake landed upon this coast, only a few miles northward from this Bay of San Francisco, at a bay which still bears his name. It will be interesting to know how things looked in this country at that time. After telling us how the natives mistook them for gods, and worshipped them, and offered sacrifices to them, much against their will, and how he took possession of the country in the name of Queen Elizabeth, the narrative goes on—"Our necessaire business being ended, our general with his companie travailed up into the countrey to their villiages, where he found heardes of deere by 1000 in a companie, being most large and fat of bodie. We found the whole countrey to be a warren of a strange kind of connies, their bodies in bigness as be the Barbarie connies, their heads as the heads of ours, the feet of a want (mole), and the taile of a rat, being of great length; under her chinne, on either side, a bagge, into which she gathered her meate, when she hath filled her bellie abroad. The people do eat their bodies, and make great accompt of their skinnes, for their king's coat was made out of them. Our general called this country Nova Albion, and that for two causes—the one in respect of the white banks and cliffes which lie towards the sea, and the other because it might have some affinitie with our countrey in name, which sometime was so-called. *There is no part of earth here to be taken up wherein there is not a reasonable quantitie of gold or silver.*" Everyone will at once recognise the burrowing squirrel that still survives to plague the farmer, and who, it will be seen, is a very ancient inhabitant of the field he molests; and no one but will dwell upon the words in which he speaks of the gold and silver abounding in this country. Were they but a happy guess in a gold mad age—a miracle of sagacity—or a veritable prophecy? A. HEATHERINGTON.

Halifax, N.S., March 30.

* Trübner and Co., 57-59, Ludgate Hill, London.

THE NEW MANGANESE BRONZE.

SIR,—I read your notice of the paper of Mr. Gautier, of Paris, and the discussion thereon, entitled the Uses of Ferro-Manganese, with great interest, because I had long been of opinion that manganese would ultimately occupy a most important position in metallurgy as an alloy, and that scientific metallurgists could not pay too much attention to it. Whatever may be the future uses of ferro-manganese—in which, by the way, the beds of umber (which contain 10 per cent. of manganese) might be available—I think there can be no doubt that the most important alloy which has ever, perhaps, been brought into notice is that now called Manganese Bronze.

The best brass we may take as being composed of 80 parts copper and 20 zinc, and we know the vast range which brass has for a variety of useful purposes. Bronze we may take as being composed of 90 parts copper and 10 tin; but it is important to observe that an addition of manganese to either of these compounds, but more especially the latter, not only marvellously improves the bronze, but gives us a virtually new metal. Astonishing as it may seem, the strength of the new metal, as compared with wrought-iron is computed as 1000 to 360, while it is twice as strong as brass, bronze, gun and "white" metal. Its value is increased in just those points which are regarded as essentials. It is harder, it is tougher, it is more elastic—so much so that, while the best wrought iron reaches its elastic limit under a strain of 10 tons, has a breaking strain of from 22 to 24 tons, and an elongation of from 10 to 15 per cent., a forged piece of manganese bronze bore a strain of 12 tons, a breaking strain of 30 tons, and has an elongation of 20·7, and, in some instances, of even 35·5 per cent. It can also be forged, rolled, and otherwise manipulated with the greatest facility at a red-heat, and the hardness, toughness, and elasticity appear to be readily varied according to the mode of treatment. No better instance of its superiority can be given than the fact that no metal or alloy, except phosphor bronze—to which manganese bronze is to preferred—could be found to bear the strain of the engines of the new vessel, the Shah, on her crank-bearings, and that the vessel was rendered practically valueless until that alloy was tried, and which has alone fulfilled the requirements. The quantity of manganese is small—only, perhaps, from 1 to 2 per cent.; but even this one would think may increase the value of this somewhat limited mineral.

Wherever gun or "white" metal or copper and its compounds—brass, bronze, &c.—have been used, manganese bronze seems fated to take their place. Thus, it will be used for all bearings for engines of every description, for slide-valves, pistons, &c., for boiler-tubes for locomotives, for fire-boxes instead of copper, for hydraulic press cylinders, and all high-pressure pumps. In fact, wherever the greatest hardness and toughness are necessary manganese bronze will become a necessity, and the sooner all machinists appreciate its value the better for their customers and themselves. Moreover, it is a very handsome metal when polished, and retains its lustre much longer than brass. The experiments of Col. Younghusband, of the Royal Gun Factories, Woolwich, from some samples supplied by the White Metal Company, Southwark, have put the qualities of the new compound beyond question. The most remarkable suggestion which has been made, however, is that it should at once supersede the use of copper for sheathing vessels, and that of wrought-iron and steel for plating our war-ships. Careful calculations show that the bronze of two-thirds of the thickness of the iron or steel plate would not only be lighter to carry, but would have greater resisting power, while a plate of the same thickness would be twice as powerful. Again, a shot of steel striking a bronze-plated ship would not split and crack and shatter this plate into a thousand pieces to the imminent danger of those fighting it, as is the case with steel plates; but the shot would literally have to force its way, by drilling a hole through the tough and elastic bronze, which might be easily plugged. The same arguments apply in every point to the manufacture of cannon and guns of all descriptions. From Colonel Younghusband downwards all agree, also, as to the fineness and evenness of the texture and the perfect homogeneity of the metal, while it has been observed that the contraction in diameter, when elongated, is perfectly symmetrical.

Some of your readers may be surprised, perhaps, at the vast importance attributed to these facts in estimating the future of this new alloy; but when they come to think of the wonderful difference they may make to the mining industries of Cornwall and Devon they will not be so. As manganese bronze must contain (say) 88 per cent. of copper, 10 of tin, and 2 of manganese, it is impossible to over-estimate their value in this respect. A demand for this alloy, such as we may reasonably anticipate will after a time arise for it both at home and abroad, from the infinity of uses to which it may be applied, will resuscitate the copper, tin, and manganese interests, the second of which is almost in a ruinous condition from the low price of that metal.

What the supply of manganese may be it is not easy to calculate; but I see in the Transactions of the Devonshire Association, July, 1875, it is stated by Mr. Worth, F.G.S., that "Manganese was discovered about 1815 in what is now the manganese district of the county *par excellence*, the neighbourhood of Milton Abbot." "Devon," he goes on to say, "is now the only source of the manganese supply of the kingdom." However this may be, there certainly seems a fair chance of copper, tin, and manganese interests being roused after a time into activity and prosperity. METALLURGIST.

April 18.

THE AMMONIA PROCESS.

SIR,—I was much interested in the article on this subject in last week's Journal, but have been rather surprised that a process which professedly offers so many advantages has made so little way with those acquainted with the chemistry of ores. If it is capable of producing the results it seems to indicate it ought to be a most invaluable adjunct in the treatment of such ores as abound in the Western Counties. Any process which can really dispense with the cumbersome and dirty process of chloridisation by salt, and the subsequent precipitation by iron, must be worthy of the attention of all who are pursuing the new and improved methods of ore extraction. Is the cost of the ammonia process not a rather serious element? It is well known that platinum is one of the most costly of metals, and as it enters into the first of the plant required it would be interesting to know something more of the cost of the necessary plant. Miners, as a rule, are not rich, and if called on to lay out a large sum for plant it would somewhat retard the general adoption of this process. Then the agent employed is not a cheap one. Ammonia costs a considerable sum, to begin with, and is so very volatile a substance that, unless it can be carefully saved and retained for repeated use must involve this process in a considerable daily cost for the chief agent. It would be interesting to obtain a little more certain and definite information on this point.

There is a third point of great importance. Is there not some difficulty and considerable expense attending the roasting of ores to the proper degree in order that the copper or silver may be entirely extracted, especially in treating the poorer descriptions of ores? These several considerations are elements of cost which must, more or less, affect the utility of a process for the extraction of metals from low-class ores; and if the patentees can give satisfactory information on these points I think it would enable parties interested to look favourably upon what at present has the appearance of an expensive process. ENQUIRER.

BLUE BRASS—SPELTER BEARINGS FOR MACHINERY.

SIR,—Although I have noticed several references within the last few months to a new alloy, which is being introduced under the name of blue brass, I have seen no statement as to the metals of which the alloy consists; yet, without a knowledge of this, but few would be inclined to give it a trial before its reputation is thoroughly established. Having an inclination to try whatever is new and likely to be useful, I have made numerous enquiries among metal dealers, none of whom, however, even among those who have seen it, can give me any reliable description of it. So far as I can comprehend, it is ingot zinc or spelter, alloyed with just sufficient lead to take off the brittleness without seriously affecting the hardness, and I am quite inclined to think that such an alloy, when carefully prepared, would be likely to prove available as bearing metal for light machinery, though it would probably prove unsuitable for heavy work.

Assuming the alloy to be of the composition I mention, I should object to the term blue brass as conveying an entirely erroneous impression, and as calculated to lead to its employment in positions where its use would be absolutely dangerous. Mystery with regard to a new article of commerce is at all times prejudicial to its adoption, and more especially when the details made public do not appear to justify the claims made for it; thus, we expect a bearing metal to be hard, and not likely to be injured by great heat, yet what is blue brass described as? It is declared to be very dense, and not liable to damage when submitted to a pressure of 40 tons to the square inch. The point of melting is about 1000° Fahr., which would indicate a zinc and lead alloy. The material can be re-melted with but slight loss of weight, and preference is given to a close-mouthed crucible instead of an open ladle. As zinc readily evaporates such a suggestion would be necessary with a zinc alloy, and the alloy can be shaped in ordinary dry sand, and soldered with any soft solder—all of these facts indicate a zinc alloy, and if it be such there is no reason to call it blue brass. But, of course, it may happen that blue brass contains no zinc, in which case I should like to offer the suggestion that zinc be tested in competition with it.

The best gun-metal—phosphor-bronze—for machinery bearings is worth 120*l.* per ton, whilst Rhenish or Silesian spelter can be bought as it comes into the London market at 24*l.* per ton, and I am inclined to think that in its commercial position it contains sufficient lead and other impurities to counteract the brittleness of the zinc, whilst the re-melting and casting into the bearing would go far to prevent its breaking into laminæ, as the spelter in the form it is imported sometimes will. It would, however, be at least worth the trial to make a few ordinary commercial spelter bearings, and test them both with heavy and light machinery, and I am inclined to think that it would prove equal to blue brass, which, for anything I know to the contrary, may be more costly. If spelter should prove a good bearing metal it will certainly open out a new industry, and be advantageous, from its cheapness, to all users of machinery.

Birmingham, April 19. S. G.

ANOTHER LIFE-SAVING APPARATUS.

SIR,—Some years ago a correspondent of yours, "J. R.," who is content with the fallacious furnace ventilation, wrote satirically of me to the following effect:—"I suppose the next exploit of this gentleman will be a trip across the Channel by some new system of navigation, resulting in the future safety of all upon the sea." If that individual should still be living, it may be satisfactory to him to learn that his insulting prognostication is likely to be verified to some extent, as will appear by the following article:—

COLWELL'S PATENT LIFEBOAT.—This novel apparatus is not designed to compete with any now used for coast service, but for use in the Mercantile Marine Service and for perfect safety in all cases of recreation upon any water. The first exhibition of this invention took place on Thursday morning week, in the River Yare, when the weight of two men showed a depression of less than 1 in., with the plug out, and not more than 6 in. of water within her, which seems to be the maximum, or in other words that it filled from the top, so long as any hole remains open at the bottom she will rise to her level of safety. We had an an intimation of Mr. Colwell's intention to proceed to sea the same afternoon and to sail past our piers and jetty, but he was delayed beyond the service of the tide, and as there was no wind he could not get far from land, and, therefore, returned to the harbour before the flood could further retard his progress, with a promise to give additional proof of

her capabilities before his start for London by sea in this remarkable craft, which is named the Tiny Ark. A brief description of the Ark in question will doubtless be pleasing to our readers, as many of whom have already heard of Mr. Colwell's intentions in this respect, and who are equally acquainted with his natural propensity to devise the means of preserving human life, even from explosions in collieries, with which his name has long been familiar to the readers of the *Mining Journal*. The boat's extreme length is 9 feet; her first construction being about 3 feet beam. A keelson is next fixed about her then water line and a second boat built on with timbers, &c., as in the first process: but this outer division is closely packed with cork shavings and securely covered in. Air tanks are next formed fore and aft by means of bulkheads with a stowage over them for provisions, &c. Outside of all is fixed a solid mass of cork, covered with prepared canvass and furnished with looped ropes, to which, it is alleged, twenty persons may grasp in temporary safety from a watery grave. She is cutter rigged, her rudder is made of whalebone covered with india-rubber, and is of fish-tail shape so as to assist in her propulsion, and to this is added a somewhat similar appliance for a like object, and to render her self-righting a deep keel is added for sea purposes, the whole of her length containing a considerable weight of galvanised iron. Mr. Colwell pledges himself willing to be secured on the floor of the boat and to be pitched stern on from any ship's side into the sea. He has another lifeboat, named the Tiny, which is only 5 ft. 3 in., and this he intends to exhibit in Yarmouth roadstead, he having already been safely afloat in her when full of water. The chief object of th's invention is to utilise space which would otherwise be wasted, and thereby add buoyancy to all such parts where the admission of water would be fatal. It is from first to last a pleasing novelty, and if generally adopted the frequency of boat accidents will not only be materially guarded against on our rivers, but sea-going vessels may be provided with the means on a very small scale of hauling off sufferers from damaged ships, &c., when no ordinary boat would be available, and on a larger scale to add greatly to the future safety of passengers and crew. This is another boon for our seamen and all who venture upon the watery element. We heartily wish to see it fully and fairly tested, and as heartily to congratulate Mr. Colwell, if his promises are to be borne out by such test. His antecedents in scientific pursuits should justify a reasonable hope of entire success.—*Yarmouth Independent*.

This is perfectly true; but there is another problem solved which I have purposely withheld from the public for a little while. Still, as I must be in France before May 6, "J. R." may yet learn that I crossed the Channel in one of my two boats, and perhaps the smallest, by an entirely new means of propulsion.

Education should induce discrimination and a sense of justice, but failing in both, "J. R." need not be much surprised if the labouring miners when they see these things were to believe something of my suggestions for their own safety, and insist on a fair trial at once. I fear there are many more such as "J. R." C. COLWELL.

Southtown, Yarmouth, April 19.

JOHN BAGNALL AND SONS (LIMITED), AND ITS MANAGEMENT.

SIR,—If one were to judge from the number of managers employed and the salaries received by the same in the above company, one would think it was one of the best dividend-paying concerns in the kingdom; but, unfortunately for the shareholders, such is not the case. The company was floated three years ago, and such was the confidence of the public as to its *bona fide* character that there was nearly four times the amount of capital required applied for, and those numerous applicants whose money was returned no doubt now consider themselves fortunate men. It seems very singular that a concern like this, whose brand stands A 1 in all the markets of the world, which has been carried on with marked success for a period of 70 years, and in which it is well known there have been several princely fortunes made, should, after working for three years as a public company, make a loss of 15,000*l*. The last yearly report issued to the shareholders says this disastrous state of things is due mainly to bad trade, but everyone who knows anything about the concern knows that it is due mainly to bad management and extravagant salaries. It is one of the chapters of accidents that have placed the Messrs. Nayler in the position they are in, and it would have been well for the shareholders if they had proved themselves able to perform the duties devolving upon them in a more satisfactory manner. It is well known by parties who have formerly done business with the firm that the Messrs. Bagnall were their own managers; and since the late Mr. James Bagnall was unable to attend to the management himself, the concern has been like a ship at sea without a rudder—and it is to be feared that the good craft is already running amongst the breakers, and unless there is a competent pilot put on board as quickly as possible, the concern may speedily become a total wreck, to the dismay of the unfortunate shareholders. W. J.

Birmingham, April 18.

CARDIGANSHIRE MINES, NEW AND OLD.

SIR,—It gives me great pleasure to be able to inform you that during the past month or two a very excellent discovery has been made at a mine newly started, adjoining the celebrated old Cwmystwith, and, as its name—West Cwmystwith—implies, is situate to the west of it. The lodes of Cwmystwith have yielded a greater quantity of lead ore than any others in the county, and in the Cwmystwith grant alone are supposed to have realised not less than between two and three millions sterling, and have made immense profits, and several fortunes. The West Cwmystwith Company made their discovery in the deep adit level, on a vein called Harry's lode. This adit level is driven northward, at a height of about 90 ft. above the River Ystwith, and in a direction to cut all the veins that pass through the grant, which is very extensive, being as nearly as possible a mile square. Harry's lode was intersected with a height or cover of nearly 40 fms., and the course of ore, which may be estimated at about 5 tons per fathom, was laid open by stripping down the north side of the lode, driving east of cross-cut, and has now been laid open for nearly 20 fms. long. Above the deep adit, about 120 ft., another adit level, which is called No. 2 adit level, was taken up and driven northward, and intersected Harry's lode, where there is being laid open the richest course of lead ore now being worked in Cardiganshire, with very high backs over it, and the ground all whole from the Deep to the No. 2 adit level. Here, then, we have something refreshing, and it is to be hoped may be the dawning of better times, for as they say that "misfortunes very seldom come single," it generally equally applies that one slice of good luck is almost certain to be quickly followed by others.

I will conclude my remarks about this property by stating that when adequate machinery for working it has been erected, and which they are now engaged about, that this mine will prove to be as rich as the old Cwmystwith, or, perhaps, as any mine that has ever been worked in the Principality. The same party have also made arrangements with the landowner for working the Caegynon Mine, where there are excellent courses of blende, and some good lead ore ground laid open; and it will be sufficient to say that had the last company that worked it had the present price obtainable for blende they would have worked it at a considerable profit instead of at a loss, and there is no earthly reason why this should not be the case when the present parties have completed the erection of their machinery, and made their arrangements for properly working the mine.

Further down the valley, at Cwmcaer, they have another property, which, if properly handled, cannot but prove successful, and of great benefit to the community at large. Another excellent mine that has recently been brought into a state of profits is the old Grogwinion, which may be looked upon as a mine as safe to give regular dividends for the next 50 years as if a party invested in Consols. The returns have now reached 100 tons monthly, and are likely to increase. The same manager, Mr. Kitto, is engaged in working several other mines in the county, all of great promise; and with his practical skill and judgment, and being backed by a moderate amount of capital, he is very likely to bring the most, if not all, of them into the dividend-paying list. The efforts that this gentleman has made are much appreciated by the mining community at large.

The old mines that are now standing idle are Cwm Brwyno, Esgair-hir, and Cwm Erfin. The Cwm Brwyno machinery has been purchased by some local parties for 650*l*. This mine has been worked unsuccessfully for many years, and at a loss of many thousands of pounds sterling. It is understood that they are now endeavouring to get a heavy premium on their purchase, but in the present state of the mining market it should be considered sufficient to get back the full amount they paid, provided they can induce a party to give the mine a spirited trial. The object now should be to make mining popular, and benefit the neighbourhood.

The Esgair-hir machinery, it is said, has also been purchased for some few hundreds. This mine has been worked during the last 30 years unsuccessfully, and although rich courses of ore have been laid open, they have not been able to place the account on the right side of the ledger. If they could obtain the money given for the machinery from a company who would work the property, surely they should be content, more particularly so as they would in all probability have to supply both Cwm Brwyno and Esgair-hir with mining stores, on which, judging from every appearance, the profits must be enormous. Parties of this sort who purchase machinery for the sake of gain only, instead of doing good to the community, do quite the reverse, and it is one of the greatest evils of the present time that we have to contend with, and it is to be ardently hoped that capitalists will set their faces against such practices, and teach them a better lesson for the future.

Cwm Erfin during the last 12 years of its working gave a profit of nearer 40,000*l*. than 30,000*l*., and continued to divide profits to the last day of working, and has been since worked by the proprietor at some small gain. The machinery, buildings, &c., which cost 6000*l*., are offered for 2000*l*., with a new lease for 21 years, at a reduced royalty, and I am persuaded that any competent party taking it in hand, with a working outlay of 2000*l*. in addition to the purchase money, would lay open a mine that would give 5000*l*. a-year during the said term of lease. ABSALOM FRANCIS.

Goginan, April 16.

SUCCESSFUL PURCHASE OF MINING SHARES.

SIR,—I send you a statement of a purchase I made in the Tincroft Mine shares, and the result: I think it may be interesting to the readers of the Journal at the present time, and if you also think so, perhaps you will give it insertion.—*April* 13. W. K. G.

TINCROFT MINES.

1860—Feb. 6: I bought 40 shares at 5*l*. 2s. 6 l.	£205	0	0
1865—July 28: I bought 6 shares at 17*l*. 6s. 3d.	104	17	6
Total	£308	17	6
1868—Oct.: I sold 25 shares at 12*l*. 10s.	£312	10	0
1870—Aug.: I sold 10 shares at 19*l*. 10s.	295	0	0
1876—Jan.: I sold 11 shares at 19*l*. 5s.	211	15	0
Dividends received from May 6, 1861, to Nov. 25, 1875	770	17	6
Total	£1590	2	6
Deduct cost of 46 shares	308	17	6
Leaving profit	£1281	5	0

CORNISH MINING—THE DUES QUESTION.

SIR,—Few subjects have been more fruitful of discussion and discontent from time to time than this, but notwithstanding the often repeated ventilation of grievances no progress has been made, and little or no good has been resultant. From the tenor of your report from Cornwall last week, we are bound to believe that in some cases injustice is done to mines by the present system, but Old Treburgett case is not at all representative of Cornish mines. It may be rather attributed to the old, and indeed obsolete, method of levying dues rather than to that of the present. Although the case cited above may be one where absolute injustice is being done to the mine, yet we question if a system of levying dues on profits would be at all desirable to the community, or fair to the landholders. Cornish mining is worked under some disadvantages, and the paying of a certain royalty is one. If the shareholders in any mine consider that their being saddled with these dues precludes the possibility of their gaining profits at a reasonable rate they are bound in duty to cease working entirely unless more favourable terms are obtained. The landlord will then lose the whole of the dues, whereas if he were contented to take a reduced rate he might be taking up a considerable sum annually. He will, therefore, see the necessity of granting mine leases at the lowest possible rate.

Cornish mining men have been in the habit of regarding the lords as hard masters, who reap a rich golden harvest from others' sowing with no trouble, and as little risk. At first sight it does seem rather hard that the owner of the mineral rights has matters pretty much in his own hands, and the hardship is increased when we find those who have taken all the risks are barely earning interest—often not that—whilst the landlord coolly pockets his proportion of dues, with a good-humoured chuckle at the folly of the men who work a concern for his own sole gain. Years ago the average rate of dues charged throughout the county was about 1-14th—now it is less than 1-20th. The highest proportion is 1-8th, which is charged to tin streamers, and it ranges away down to 1-80th. Very often we notice the lords remitting the dues, or giving a large discount, finding it to be their interest to give way to circumstances a little, but notwithstanding this there are very many dissatisfied ones. The question with these should be, "How far will it pay the lords to give way to our demands, or how much ought they in equity to concede?" The giving publicity to a grievance may be a right step, but it is as far as ever from redress.

If an injustice is being suffered through unfairness in the proportion of dues by the mine shareholders as a body is being tamely endured, we cannot hold either their business nor manly qualities in very high esteem. Complaints seldom gain much, action only is attended with substantial results. Cornish mine managers find themselves, however, very much in the hands of the land and mineral proprietors, and independence would, perhaps, not be appreciated by these. For this reason the chief officers of mines have to be guided very much by expediency, and they are very cautious as to enunciating their true ideas. It has been generally considered that the lords, the bankers, and the smelters have matters all their own way in Cornwall, and that the common voice is either never raised, or that the feeble cry is too insignificant to provoke notice; the whole power being in the hands of the few, they can easily crush any single opposer.

In this matter of reconstructing the basis of levying of dues there is little or no chance of united action, and unless "One and All" can be the cry it is impossible to effect anything. If unity were secured the mass could dictate to the few, the executive of mines could say on applying for a renewal of lease, "We are not satisfied with your terms; levy your duties on profits, or we will give up our lease and cease working." Many struggling mines could with perfect reason act in this way, for the present system is too much for them to bear, but rich mines like Dolcoath to do so would be ridiculous. Unity, too, might result in a petition being sent to Parliament, and legislation might accomplish what private effort could never do, for individuals to write volumes even on it would be sheer waste of time. There is, it appears, too much of incapacity, of division, of petty jealousy in that county of "fish, tin, and copper." There is an entire lack of public spirit, and the ideas of the people are often very one-sided.

In reference to dues, Mr. E. C. Marriott said much to vindicate the action of the lords at West Wheal Seton meeting a year or two ago. Ask the tourist or traveller his experience of West Cornwall, and he will tell you it is a barren desert. We know it to be little else compared with fertile Devon. Huge unsightly buildings with tall chimneys elevate their hideous shapes towards the heavens, rivers deeply coloured by polluting mineral matter flow down the valleys with a load of filth, whole districts are covered with refuse mineralised stuff and rubbish heaps. A land desolated, in fact. Does the money drawn from its mines compensate the landholder for all this loss—for grim abysses and rocky heights where cattle should graze and corn be sown? Do the paltry thousands they get annually from mines compensate them and their heirs and successors for all this destruction, and for the poison the tall chimneys vomit over the land—sulphureous ashes and arsenical vapour? Can the county at large ever be paid for the loss it sustains through all this desolation? We trow not. It serves as a cry to complain of the hard dealings of the lords, but it should be remembered that they issue no solicitations to people. The mining public work of their own will. They accept the landlord's terms. They go to work on those conditions. They are fully aware of their liability under those conditions. Why, then, these complaints?

If it is necessary to remodel or consider the present system of levying dues let a committee be appointed to sit upon the matter, but away with grumbling. It should not be forgotten that in the event of dues being levied on profits the lords would be entitled fairly to something like one-half of them, and we think that then the discontent would not be diminished. I trust you will pardon my writing at such length, but it will need no excuse if you are so disgusted with this continual grumbling, now of deterioration of men, now of rickety engines, now of the Stannary Court, again of the Mines Rating Act, and lastly of the levying of dues as is your correspondent—

April 19. N. B.

PRESENT STATE OF MINING IN CORNWALL.

SIR,—The case of Old Treburgett Mine suggests many thoughts. Here a leaseholder grants a sub-lease at a most heavy royalty greatly to his own profit, and then comes a complication of the sub-lease having freehold mineral rights adjoining, into which the ore dips. The difficulty seems to be how the ore shall be taken from the freehold and drawn up through the leasehold land, and what compensation shall be paid for doing so. Unless this difficulty can be arranged 80 miners will be thrown out of employ, and that in a mine which otherwise would be profitable to the shareholders, who have spent a large amount of money in discovering it.

Is it not time that the attention of the lords should be drawn to the present state of Cornish mining? Capital has not hitherto been wanting to work the mines in their property, but excessive dues, heavy minimum rents; and last, but not least, the covenants providing that no level shall be driven into another lord's land, or any shaft or surface used for such level, without exorbitant compensation, have had a very serious effect upon mining industry. Legislative measures, such as the Valuation of Properties Bill, which rates mines as well as game and plantations, and the Metalliferous Mines Regulation Act have also interfered with it.

What is the result? The great majority of the fine old body of Cornish tributers, the bone and sinew of the county, not being able to find employment here have emigrated, and with them have carried away an amount of practical mining knowledge that has opened up Cuba, Chili, South Australia, and especially North Australia. This is the cause of the present depression that now exists in our midst. Our best men are abroad, and have discovered the mineral riches of foreign countries, and have beaten us in the race.

It is much to be feared that not until a home-loving race like the Cornish miners have found a new home far away, and a new Camborne, a new Redruth, and a new St. Day, with their chapels, have arisen, the Cornish lords will find they have not borne their share of the burden of the present depression. There are a few noble exceptions. Good miners are flying from the county, and unless something be done Cornwall will soon have to be described as an agricultural county.—*April* 19. CORNWALL.

PROSPECTS OF CORNISH MINING.

SIR,—It is wonderful the apathy displayed by the public towards the copper and lead mining of the county, and more especially when it is palpable to all having the slightest knowledge of such matters that no branch of mining industry pays like copper and lead mining. Of unwrought copper ground there is yet an unexhaustible field for the investor, and the capital required to sufficiently prove the value of the different sections of ground known to the writer is little when compared to the promotion money alone paid for some bubble schemes introduced by our friends across the Atlantic. In the vicinity of the different granite hills which abound in the county strong masterly lodes are to be found in connection with elvans, having also the great desideratum—cross-courses traversing the ground from north to south, striking the east and west copper lodes at angles conducive to the production of copper deposits. There is no mineral that will compete with foreign productions like that of copper, maintaining as it has for many years a steady and remunerative price to the producer. The failures which have been the primary cause of the present mining depression have not been in copper mining, on the contrary, for out of the few mines being wrought around the Kit Hill and Caradon granite ranges alone there are five mines paying dividends from copper. Come further west again to St. Austell district where there is a splendid field for mining, now quite at a standstill. Immense profits have been made from this district on copper, which although is now quite neglected will again become a great copper mining field. The writer was once a shareholder in a little mine here called South Crinnis, when the shares were 500*l*. per share, and if memory serves me rightly was never sunk deeper than about 50 fms. from surface, a second deposit may yet be found here on a deeper development to equal that which gave dividends of 20*l*. per share bi-monthly for some time. Come further west still and look at the fortunes made out of copper mines around the Carn Marth and Carn Brea ranges of granite, true the very deep ones have turned into tin, and a glance at the price of shares now, compared with three years since, will at once show the precarious nature of deep tin mining property when compared with that of shallow copper or lead mining. Probably the greatest success attending copper mining in the whole county has been around Carn Marth, now comparatively neglected. Both to the east and west of the great cross-course (known as the county cross-course) there are pieces of unwrought mineral-bearing ground known to embrace lodes of great width, requiring only a small capital to open up deposits of copper comparing favourably with any yet discovered in the neighbourhood. The working of shallow mines gave profits which founded the rich families of this county, and it must be remembered that to work half-a-dozen of such mines does not require the capital necessary to resuscitate one deep and extensive mine, while the success attending such operations is doubly sure. C. BAWDEN.

St. Day, Scorrier, Cornwall, April 18.

LLANRWST LEAD MINE.

SIR,—As a shareholder I am glad to find that more comprehensive measures are about to be adopted for the vigorous prosecution of this mine. It will be more satisfactory to the shareholders, as well as convincing to the general public, to learn from sales of ore taking place from time to time the actual producing capacity of the mine than to hear repetitions of its continued successful development—good as that is in itself—without such confirmation. We naturally expect a period of successful development to be followed in due time by corresponding profitable returns, which in the case of this mine I have no doubt will be duly forthcoming. Now that it has been decided to inaugurate an enlarged and more efficient scale of working, it is to be hoped that no time will be lost in bringing about the season of returns. I know that many eyes are upon this mine—some whose prejudice is made to do duty for scepticism, and others implicitly confiding. Of the latter I freely confess myself one. I am, therefore, the more anxious to witness the issue because of that confidence, and also for the benefit which its realisation will confer, not only upon those immediately interested, but upon mining generally in that part of the country. A SHAREHOLDER.

THE LEAD MINES OF DERBYSHIRE.—No. IV.

SIR,—In No. III. of this series "the fourth the best," ought to have been "the fourth the least." It may be as well to repeat that of the four divisions of the Derbyshire limestone the first or uppermost is the most productive of lead, the fourth or lowest is the least so. The lead veins of Derbyshire are of two kinds, rake veins and pipe veins. The rakes, which are most frequent, are like the Cornish lodes—clefts or fissures in the limestone, running more or less east and west, and extending to an unknown depth. It is true that they are generally cut off by layers of toadstone, but in most cases the vein is again found below, though not always in the same line as above; when this happens they are said by the miners to be "squinted." In some cases the vein makes rich in the toadstone, as was the case in the rich Gang Mine near Cromford, the Ladywash near Eyam, and a few others. The pipe vein goes down more or less vertically, and may be compared to a chimney or bell-shaped deposit. They have been extremely rich, especially the Ecton Mine near Hartington, where a shaft has been sunk nearly 300 fms. on a pipe vein. When visiting the Ecton, about 20 years ago, we were told by an old miner who remembered the mine at work, that the upper part of the vein contained lead, beneath which was an immense deposit of rich yellow copper ore, and still deeper a mass of mundic; as this was worthless, the mine was suspended on that account, and not from the influx of water. The old man expressed his belief that if the mundic were sunk through another deposit of copper or lead would be found. Other examples of pipe veins are the Mandale vein in Lathkill Dale—a very old mine, re-worked some

30 years ago with disastrous results, owing to the heavy water; also the Hubberdale pipe near Monyash, and those once rich mines, Placket and Portaway, near Winster. With reference to the toad-stone, we may observe that it is not found everywhere in the Derbyshire mines; there are large districts without it, especially in the north. It is doubtful how many layers there are—some say three, others four. The colour is usually a blackish grey, sometimes with a yellow tinge, often very hard, but in places so decomposed as to form a plastic clay. The basset edges often form dark cliffs, as in Bonsall village, near the church. The fourth limestone, though generally poor in ore, is far thicker than the others; it is developed on a grand scale in Dovedale, where it forms lofty cliffs several hundred feet high, and no base seen. It is more compact than the upper divisions, and is much burnt for lime. The most common veinstuffs in the district are calc-spar, sulphate of barytes, and fluor-spar; also ochre and a sort of china-clay are found in some of the veins on the western side. Cale-spar is the most frequent, as may be seen in the mine hillocks, especially in the southern district.

J. B.

UNFENCED SHAFTS.

SIR,—The late Act of Parliament, which makes it obligatory on lessees and lords of mines to fence all unused shafts, has been the instrument of preventing much loss of life, for it is well known that previously deaths from the want of such protection were not unfrequent. I have known many—very many—instances of the kind. The Earl of Falmouth, the Rev. C. St. Aubyn, and H. M. St. Aubyn, I perceive, have expended a great deal of money in thus complying with the Act. But in my excursions through the mining districts I still observe many which are unfenced and very dangerous to man and beast. If Dr. Foster, the Inspector of Mines, knew of these he would, I dare say, give notice to the parties concerned to do their duty in this respect. On the ground of humanity as well as of law I recommend the attention of those parties to their duty.

Having seen the great evil of covering shafts with wood, particularly with deal, which, after a few years, decays and subsides under pressure, and thus causes sometimes loss of life, I advise that in no case wood be employed. If covering be adopted instead of fencing round the shaft, let it be arched with stone, so that the covering shall be effectual. A timber-covered shaft is little better than an awful trap. The covering of two or three shafts near the West Cornwall Railway fell in—one partly under the rails. The train was stopped in the latter case, and the passengers walked to Truro, four miles distant. A few days ago I saw the shaft, 40 fms. deep, in a field (the top level with the surface) with only a little rotten branch put over it, and cattle grazing around. After a man or a cow has fallen into it I suppose it will be fenced to prevent further loss.

R. SYMONS.

Truro, April 18

MINING VERSUS UNDERMINING.

SIR,—A few remarks were made last week on the underminer; the subject not being a very interesting one, we wish now to refer to the genuine miner—without whom the industries and wealth of the country would be *nil*. We presume, then, that for every 1*l*. worth of minerals raised and refined that 10-16ths of it is spent on labour and management in its various forms, 3-16ths in machinery, materials, &c., and about 1-16th to the lords, as dues, thus leaving 2s. 6d. to pay capital and interest. It is obvious, therefore, that the first attention should be given to the chief item named, and to get the largest amount of work done at the smallest charge; equal attention is also required in order to ensure the shareholders' money finding its way to the mine and being properly used there. It is much to be feared that the present extravagant way of floating companies cripples the finances of most young concerns, and effectually prevents them from struggling into life. Here, certainly, the Cost-book System has the advantage over the Limited Liability. A few persons join and agree to raise money to work a certain piece of mineral ground in which they have some faith, and for this purpose make a call, to provide funds for the ensuing four months; at the expiration of such four months the accounts are presented to the shareholders, reports received, and the true state of things discovered.

It is impossible to be able, with any degree of accuracy, to calculate the amount of money required to bring a mine into a profitable position; a few hundreds of pounds only were expended on Devon Consols and South Caradon Mines—these two alone have paid in dividends about a million and a-half sterling. There are, doubtless, many rich veins yet undiscovered, and we believe such future discoveries will have to be made by companies worked on the Cost-book principle. We are aware that promoters and brokers prefer the Limited company, it provides more scope for their dealings; and while we have seen advice given by some to avoid the cost-book as they would a serpent, we have reason to know that in the avoidance of the serpent the hungry jaws of the tiger were awaiting them. Bulls and bears are dangerous animals, but tigers, hyenas, and wolves much more so, especially when they conspire together. We close this portion of our paper by expressing a hope that the time has arrived when, by mining circulars, the public will not be drawn into worthless schemes, and further, that we may soon see confidence restored, and mining generally conducted on sound principles, being assured that if such is the case the capitalist will be paid, the industry of the kingdom supported, and the necessary contingent prosperity to all.

T. VOSPER.

Finsbury Circus, April 13.

MINING SHARES.

SIR,—The depression which has so long existed in the mining market will, in all probability, give place to a better feeling as the year advances. Indications of such a very desirable change have already presented themselves, as instanced in East Van, Pennerley, and Glyn. The first-named, however, appears to be one of those unaccountable instances of the uncertainty of mining, and would appear, but for the high esteem in which the management is held, to be another instance of misrepresentation which too often occurs in the history of mining. "That a lode should be found rich at the point of intersection, and not continue so for a distance of a few feet in either direction" is, to say the least, unaccountable, but the high price to which the shares advanced on the discovery being made shows upon what small encouragement the public are prepared to support mining industry. Glyn shares, which were practically nothing, upon the report of a discovery rose to 6*l*. per share in a day, and it is to be hoped that there is not another instance of "a lode rich to day and poor to-morrow." At any rate, it would be satisfactory to know what the lode is producing now—if it is producing anything. Pennerley, on the report of a discovery of lead worth 4 tons per fathom, rose nearly 20 per cent., but that price has gone back very materially on the lode decreasing in value. It is satisfactory, however, in this instance, to note that the lead has not disappeared altogether, and that it will probably be found to continue not only in the levels where it was discovered, but also in other levels, which will come under the pot-stalls led to. East Van is selling for 150,000*l*.; Glyn for 50,000*l*.; Pennerley for 24,000*l*. The latter is returning 80 tons of lead per month, Neither of the former have yet produced sufficient for a sampling. Should the mining market be about to experience the formidable change anticipated, will there not also be a change in the relative values of these properties? A CAUTIOUS MAN.

April 20.

ROOKHOPE MINE.

SIR,—I have seen it stated and repeated several times lately that there is a lode in the winze below the 25 in this mine worth from 6 to 8 tons per fathom. I notice in Mr. Murchison's preface to his fourth edition on "British Lead Mines" he is more cautious, and writes it is stated there is a lode, &c. As a shareholder in the company I should like to know whether this lode was seen and worked upon by the late (Rookhope Valley) company, or the statement is some old man's tale who has worked there some 50 years ago, and who has done a similar duty for other mines. If the ore is there, and can be vouched for by the manager at the mine, I consider, taking all things into account—small capital, cash in hand 55*l*., future prospects, and the present low price of the shares (assuming that there is a lode in the winze as valuable as reported)—that the Rookhope Mine is the cheapest share on the market, and if any of your correspondents can assure me on the one doubtful point in my mind, I shall lose no time in considerably increasing my holding.

A SUBSCRIBER.

[For remainder of Original Correspondence, see to-day's Journal.]

COPPER MINING AT LAKE SUPERIOR.—At the Calumet and Hecla annual meeting, held at Boston, America, the actual net surplus for the year ending April 30, 1875, was shown to be $1,822,117. The surplus for 1874 was $1,853,545. The amount of copper smelted within the year was 20,704 783 lbs., which represents the actual product of the mine. It is estimated, from the best obtainable data, that the actual cost for procuring this amount of ingot copper was 12·72 c. per lb., equal to $2,633,979·74. The amount of copper actually sold within the fiscal year, April 30, 1874, to April 30, 1875, was 20,247,464 lbs., at an average of 20·54 c. per lb., realising $4,160,720·16. The company employs 2500 men, the monthly pay roll amounting to $90,000, a village of 5000 people deriving their support from employment furnished by the company. The mine is at present worked to a depth of 1400 ft., the yield of the ore averages 5 per cent. of pure copper, the vein being 15 ft. thick. The mine was discovered in 1865, operations were first commenced in 1867. Since the Calumet and the Hecla Mines were united in May, 1871, there has been paid out to stockholders the immense sum of $8,100,000, and during that time the stock was doubled without cost to the owners. The property now, $158·50 per share, is worth $14,680,000. The amount paid in by the stockholders was $1,200,000. The present yearly dividends, amounting to $1,600,000, are divided quarterly among the stockholders of the company.

THE CORNWALL CHEMICAL COMPANY—No. IV.

[*Continued from page* 411.]

The ore is dispatched from the mines after being subjected to the treatment known as "spalling," which consists in breaking off and rejecting as much as possible of the non-metallic rocky matters accompanying the ore, and then reducing the latter to pieces of a uniform size, rather larger than an ordinary egg, so that it may be fit for delivery into the crushing-mill. This consists of a building of two stories, to the upper floor of which the ore is brought by means of wagons hauled up two inclines leading respectively to the ore yard and the railway siding already described. There is a square grating in the middle of the floor, and through this the attendant shovels the ore when discharged from the wagons, the use of the grating being to arrest any pieces too large to be admitted into the crusher without danger. On one side of the grating we see a shallow trough of planking, inclining backwards, and widening as it recedes, so as to form a shoot for receiving any materials falling from above, and projecting them into the grated opening in the floor. The mouth of this shoot is situated within the upper circumference of a huge wooden wheel fixed against the wall of the building, and projecting through the floor, so as to revolve in both stories. This wheel is furnished with a broad hollow rim divided by inclined plates of iron into a series of boxes or buckets, as in the case of an ordinary water-wheel, but with their openings in precisely the reverse position—*i.e.*, towards the interior instead of the exterior of the circumference. It is termed a "raff-wheel," and is used for elevating back to the upper floor any stones that may pass through the crusher without being broken sufficiently fine. The crusher itself consists simply of two rolls about 3 ft. diameter and 1 ft. wide, made of cast-iron, with chilled faces, and placed immediately under the grating of which we have spoken. They are mounted in parallel bearings, one of which is fixed, while the other can slide horizontally to and fro, so that the rolls can be made to approach or to recede from one another. They are maintained almost in contact by the the short arm of a rectangular lever, which presses against the moveable bearing with a force proportioned to whatever weight or loading may be suspended from the long arm, the effect of this being that should an exceptionally large or hard piece of ore, or a piece of iron or other resisting material, fall between the rollers the moveable bearing will yield, and will allow the material to pass between the rolls without injury to the mill. Underneath the rolls is a sheet-iron shoot, which projects the crushed ore into the mouth of an inclined cylindrical sieve, so placed that while the finer particles fall through the meshes of the sieve into a wagon below the coarser fragments are discharged into the periphery of the raff-wheel, which, by its revolutions, carries them back to the upper floor, and shoots them into the wooden trough leading to the grating, through which they fall once more into the crusher. The whole process is thus of a very continuous and efficient character, and as the details of the machinery are simple and massive in their design, a mill of this description may be kept at work for many years without cessation, except for the purpose of changing the worn-out rolls and sieves, duplicates of which are always kept ready to hand.

The mill is driven by a very powerful horizontal engine placed in a building adjoining the mill-house, and so arranged that a second mill can be constructed on the other side, and can be worked by the same engine. This second mill is now being erected, and when complete the two together will be capable of crushing from 60 to 80 tons of ore per day. The engine has a cylinder of 25-in. diameter and 5-ft. stroke, and is supplied with steam by a boiler 30 ft. long and 7 ft. in diameter.

We have said that the ore when sufficiently crushed falls through the meshes of the revolving cylindrical sieve into wagons standing on the ground floor of the crushing-house underneath the rolls. A tramway extends from thence along the terrace at the foot of the retaining wall, forming the boundary of the ore-yard, and terminates at the head of an incline leading down the hill to the furnace-house. This incline is worked by double ropes and a brake-wheel, so that the full wagons in descending haul up those which have discharged their contents. Following one of the loaded wagons we see that at the foot of the incline there is a turntable, giving access to a tramroad extending the whole length of a platform constructed against the wall of the furnace-house, which is pierced at intervals with orifices, through which the mouths of large wooden shoots project. Into these the crushed ore is tipped from the wagons, and passes through to form a heap at the uppermost door of each furnace inside the building.

On entering the furnace-house we find ourselves in a vast structure, some 300 or 400 ft. long by 60 ft. wide, and about 25 ft. in height. The walls are of solid masonry, and the roof is of planking covered with tarred felt, and supported by light lattice bowstring girders. The pavement is of brick, and is on a level with the floors of the railway trucks on the siding outside, to which access is given by large doorways, so that coals, crushed ore, and other materials can be unloaded into the works with the atmost facility and dispatch. One end of the building is occupied by the roasting furnaces, into which the raw ore is calcined, and the other by the subliming furnaces, in which the crude arsenic is refined, while the centre is taken up by a mill and packing-house, where the refined arsenic is ground and packed.

Our first concern is with the roasting furnaces, which are six in number, and are built in pairs. They are of the ordinary reverberatory type, the fire being at one end and separated from the furnace by a fire-bridge, over which the flames play, striking against the crown and being reflected down upon the bed until they make their escape through the flue at the other end. The width of the furnace is about 6 ft., and the length about 30 ft., with doorways at intervals of 5 ft. The raw crushed ore is thrown in through the doorway nearest the flue and furthest from the fire; and then, by means of long iron tools, termed "rabbles," worked through each door in succession, it is gradually moved over the whole length of the furnace, until at length it reaches the fire-bridge, where there is a hole in the furnace bed called the "wrinkle," through which it is made to fall into a "wrinkle pit" underneath. It will be seen that the operation is continuous, as each quantity drawn through the wrinkle makes room for a fresh batch to be brought forward from the next rabbling door, and so on backwards through the furnace, until at the upper extremity a space is cleared for the introduction of a fresh charge of raw ore. This goes on, charge after charge being thrown in at one end, and being gradually rabbled through until drawn at the wrinkle, without intermission, day and night, from one year's end to another; for, provided the supplies of ore and fuel can be maintained, it is better when once a furnace is lighted to keep it constantly in operation, rather than by frequent coolings and re-heatings to uselessly consume much fuel and labour, as well as to cause considerable damage to the furnace by continual expansions and contractions of its walls and crown.

A series of chemical actions take place within the furnace. At the upper extremity the ore is gently heated and dried, thus losing all the moisture with which it had become saturated by previous exposure; and the escape of this moisture leaves it in a comparatively porous condition, a circumstance of some importance in the succeeding part of the process, as a larger surface is thereby offered for the action of oxidation. When thoroughly dry the ore is rabbled forward, and becomes more strongly heated, until at length the temperature rises high enough to induce combustion of the sulphur and arsenic present in the mineral. This combustion takes place in consequence of the atmosphere within the furnace containing a certain proportion of uncombined oxygen, which at a red heat unites with most of the constituents of the ore. With the sulphur it occasions a blue flame, owing to the formation of a gas termed sulphurous anhydride, which passes off through the flue until at length it makes its escape from the top of the main chimney stack at the upper extremity of the works. With the arsenic it gives rise to a white flame, slightly tinged with purple, this being the incandescent vapour of what is known as arsenious anhydride or oxide, which also passes away into the flue; but, unlike the sulphurous anhydride, it no sooner becomes comparatively cool than it condenses into a powder, and falls as a kind of soot in large brick chambers built to receive it. With the iron and copper contained in the ore the oxygen likewise unites so soon as the sulphur and arsenic are burnt off; but the resulting ferric and cupric oxides are not volatile, and remain in the condition of red and black powders, mixed with the rocky and earthy matters present on the bed of the furnace.

The combustion thus described becomes fiercer as the ore reaches the hotter parts of the furnace, and is accelerated by constant rabbling from door to door, each movement having the effect of stirring and turning the mass of mineral so as to expose fresh surfaces to the action of the current of flame and air from the fire. The constant stirring also prevents the several fragments of ore from fusing or caking together. The progress of the combustion is judged of by the jets of blue and white flame that rise in puffs and gusts from the surface of the ore, as well as by the colour of the glow given forth by the incandescent mass. Here it is that the skill of the workman comes into play, and enables him to judge when to urge or slacken his fire, when to admit or exclude further supplies of air, when to rabble the charge forward, and, finally, when to draw it through the wrinkle. The latter is only done when a careful lifting of the ore from the very bed of the furnace fails to produce any further flame, and when the whole mass at the lower end of the furnace glows steadily and equably throughout. The ore is then considered sufficiently roasted, and is drawn down into the wrinkle-pit, where it is quenched with a jet of water to prevent the escape of any remaining arsenical vapours.

The labour of arsenic roasting by the system we have described is very arduous, as not only are the rabbling tools of great size and weight, but the ore itself is very heavy, and in order to secure good results the charge has to be kept in continual movement. It is not to be wondered at, therefore, that attempts should have been made to supersede manual labour, and to render the process more or less automatic. In some arsenic works kilns are used for burning the ore. These resemble ordinary lime kilns in shape and operation, but they are of very small dimensions, and are built in sets of twelve, in such a manner that they form a large rectangular structure, the upper surface of which constitutes a working platform for receiving the ore to be burnt. The orifices of the kilns are covered either by flat iron plates, or by large cast-iron hoppers closed at the bottom by a sliding horizontal damper.

The ore is burnt just as it is received from the spalling-floors without being crushed, and is charged into the kilns with but occasional supplies of fuel, seeing that when burnt in a column the combustion of the sulphur and arsenic usually suffices to keep up the necessary degree of heat. From time to time the burnt ore is drawn from openings at the bottom of the kilns, and as the column sinks fresh ore is charged in at the top. Here, also, it will be seen that the process is continuous, and it will also be observed that no firing or rabbling is required; owing, however, to the large size of the fragments of ore the calcination is very imperfect, and no matter how carefully the kilns may have been tended, it is seldom that any stone of burnt ore can be broken open without finding the centre quite raw and undecomposed. It constantly happens also that the charge begins to fuse and slag together, when it is necessary to extinguish the fire and to break out the fused mass at the cost of much time and trouble. In fine, it is only for the treatment of very poor ores that the process of kiln-burning can be successfully employed, as in such cases the risks of imperfect calcination and slagging are much diminished, while the greater economy of fuel and labour is all the more important. This has not been lost sight of in connection with the Cornwall Chemical Company who, in addition to their reverberatory furnaces at Greenhill Works for the calcination of rich ores, are also working a set of 12 kilns for the low-class ores in their establishment at Redmoor, which we shall presently describe.

The only other method of arsenic burning that merits attention is still more mechanical and effective. The apparatus employed is known as Oxland and Hocking's calciner, and consists of a wrought-iron tube about 30 ft. in length and 6 ft. in diameter, supported in a slightly inclined position on friction rollers, and fitted with worm-gearing, by which it is kept in constant revolution. It is lined with fire-bricks, and at the lower end is an ordinary furnace, the flames and heated air from which pass through the whole length of the tube and make their escape into a flue at the higher extremity. The ore to be calcined is ground into a coarse powder, and is charged in through a hopper, falling just in front of the flue. By the revolution of the tube the ore is then gradually lifted until on reaching the top of the interior of the tube it again falls to the bottom to be lifted afresh, and so on, each revolution, owing to the inclined position of the tube carrying the ore a stage nearer the fire, on reaching which it falls through a space left between the end of the tube and the fire-bridge. It is, therefore, obvious that the interior of the tube must be constantly filled with a shower of ore-dust, through which the flames and heated air pass, a condition highly favourable to the completeness of the combustion, while from the ease with which the rapidity of the revolutions and the rate of feeding through the hopper can be regulated, the calcination can be carried to any desired pitch. The attendance required is also very small, being confined to firing at one end, and charging the hopper at the other. Altogether, Oxland and Hocking's calciner may be regarded as exceedingly efficient and economical, though from its large prime cost, and the necessity for employing some motive-power, it cannot always be adopted with advantage. It has also some minor defects, such as the difficulty of maintaining a proper rate of draught, the uniformity of motion at all periods of the calcination, and the carriage of undecomposed ore into the flues, which to some extent counterbalance its merits. It is, however, used with satisfactory results at the Devon Great Consols and Wheal Friendship, and is about to be adopted at New Consols.

[*To be continued in next week's Mining Journal.*]

A QUICKSILVER FURNACE FOR FINE ORE.

We examined recently a model of a new style of quicksilver furnace, designed particularly for roasting fine ore, but in which coarse ore can be reduced as well. It is the invention of Daniel Jones and Daniel Jones, jun., of this city. It is essentially a system of vertical instead of horizontal retorting, which is accomplished in quite a simple manner. The inventors are practical men and mechanics, having constructed a number of quicksilver furnaces of different patterns. They have made note of what seemed to them objections and difficulties in other furnaces, which they have endeavoured to overcome in a furnace of their own design.

The furnace may be considered as a series of retorts, as no flame comes in contact with the ore. There are only three walls to construct as the smut chamber makes the fourth side. The furnace is made of fire proof material, what ironwork there is being on the outside or covered in. On top of the furnace is a place capable of drying from 5 to 6 tons of ore. An elevator carries the ore up to the hopper on top of the furnace, where it is fed in. On the inside of the furnace are a series of inverted V-shaped chambers or retorts, which are heated by the fire. The fire is fed at the bottom and the heat, flame, and gases pass up around these chambers, and as they are hollow pass through them too; but the flame in no place touches the ore.

When the ore is dropped into the hopper it falls on to the hot inverted V-shaped chamber and then into a hot V shaped receptacle. In the bottom of this is a slide which draws out at certain intervals and drops the ore into another similar chamber, from which it in turn drops into another, and so on until it reaches the bottom. For a 20-ton furnace, which is from 15 to 20 ft. high, a double furnace would have 10 of these chambers in each side. An eccentric rod on the outside operates the slides which allow the ore to drop from one chamber to the other. This rod turns very slowly, and it will take a charge of ore about 40 minutes to drop to the bottom. Of course, as soon as the ore drops out of the upper retort another charge is admitted. Each charge is about 100 lbs., so that there would be 1 ton at a time in the furnace, and for each revolution of the eccentric 100 lbs. of ore would be charged and dropped out.

In the sides of the furnace are air holes, or holes to see the operation as the ore passes down. If necessary fire can be put on the inside of the V shaped chamber from these holes. They also afford an opportunity to clean out the chambers without taking out any brickwork. The eccentric rods are placed on both sides. In a double furnace, as in this case, there would be 10 chambers on each side, or 20 drops in all.

A stream of heated air is forced into the furnace and into the ore so as to assist

the destruction of the sulphur and give more heat. There is no place for the ore to catch and stop, but as it falls on the heated surfaces, which are all inclined, it slides on to another and so on down, being slightly retarded by the slides, which, however, allow it to drop to the lower chamber at regular intervals.

The retorts are entirely closed from the flames and gases, but are thoroughly heated, nevertheless. The furnace is accessible at any time without tearing down anything. Any particular chamber can be removed if broken and another one replaced. The chambers are made in sections, and expansion and contraction are taken into account. All the iron is covered with a material like enamel, which is fire-proof and not affected by the sulphurous fumes. The smut chamber is made in sections, and in case anything is wrong it can easily be examined without pulling down any brickwork. As no flames get at the ore the formation of much smut is prevented. In the bottom of the smut chamber is a pipe, so in case any quicksilver should collect it can be drawn off. The fumes pass into to this smut chamber and then into the condenser, any style of which can be used. Messrs. Jones have, however, condensers of their own design, which they consider more effective than those now in use. An engine runs the eccentrics which operate slides in the bottom of each separate retort.

The furnace, as before stated, is mainly for fine ore and dispenses entirely with the necessity of working adobes. A double furnace with condensers, engines, and all complete, with a capacity of 10 tons, will cost about $7000, ready to be put in motion. There are a number of advantages possessed by this furnace, but it must be seen to be appreciated.—*Mining and Scientific Press* (San Francisco.)

LEAD MINING IN DURHAM—No. II.

THE TEESDALE MINE.

In continuation of the remarks on this mine, made in the Journal of March 11, it may be stated that the sett is about two miles in length from east to west, of irregular width, but is a mile or thereabouts from north to south at the western boundary. This extensive plot of ground is situate on the slope of a hill facing towards the north-east, and is traversed near the west boundary by four powerful north and south veins, lying near to each other, and running nearly, but not quite, parallel to each other, and these veins are intersected by a large number of east and west veins running more or less at right angles to the above-named veins, and also by many branches or strings at various angles.

It sometimes happens that large deposits of lead ore are found at or near to these intersections, and more especially when the intersection takes place in an oblique manner; on other occasions when an intersection takes place the vein, hitherto productive, is what is termed "broken up" or disordered, and occasionally thrown out of its bearing, but this happens more frequently with east and west veins. The principal mining operations at present going on at this mine are on one of the north and south veins, which is worked by means of what may be termed the adit level. Another level is also being driven, called Hopkin's level, to work a vein formerly rich near surface, and also to discover another east and west vein believed to be lying unworked in whole ground, north of the said level.

The strata or rocks in this ground are a portion of the "mountain limestone," as found at Alston Moor, Weardale, Allendale, extending to the sources of the Rivers Tees, Tyne, Wear, Derwent, &c. The section here, however, does not exactly agree with the sections given in "Forster's Strata;" for instance, we have a limestone underlying what is locally known as the scar limestone, and about the same thickness (about 4½ fms.), and also a smaller one above it known in Swaledale as the chert bed, neither of which are found in the neighbourhood of Alston.

A shaft at Teesdale Mine is sunk from the surface on one of the north and south veins to a depth of 18 fms. (and unwatered by the adit level), through limestone, hazle, &c., and a considerable height of limestone can be seen at surface above the shaft, and below are other limestones—one of considerable thickness, known as the "sandy limestone"—below which lies the whin. The last named rock has of late years been found to be a productive lead-bearing sill, and is at this place from 30 to 40 fms. in thickness, and is proved to be a stratified rock. With a rock of this thickness below the deepest works at the Teesdale Mine, and every facility given in the slope of the sett for still deeper levels, it is very satisfactory to find that the vein becomes richer as the driving in it gets deeper under cover or into the hill, and that the best ore in both levels is setting down below the sole of the levels. There are several other mines in this neighbourhood worthy of notice if time and your space will allow.

FOREIGN MINING AND METALLURGY.

The committee of French forgemasters expressed an opinion at its last meeting that there had been a notable amelioration in the French iron trade since January. The committee also reported an advance of 8s. to 12s. per ton in iron of ordinary quality; this rise can scarcely be said, however, to be general at present. Upon the whole, it may be remarked that although the French iron trade may have improved since January, it is still far from being what could be wished. As regards the current aspects of the French iron trade, there is little fresh to report; pig is pretty well maintained, and this is regarded as a good sign. Some works in the Nord have rather more orders on hand just now than they can conveniently execute, as they experience considerable difficulty in meeting with the requisite number of puddlers. Under these circumstances, the question of mechanical puddling has been attracting somewhat increased attention of late. A strike broke out a few days since at MM. Sépulchre's, at Vezin-Aulnoye; this difficulty was, however, adjusted without the demanded advance in wages having been conceded.

There has been no serious symptoms of revival in the Paris copper market, which has remained quiet and feeble. Chilian in bars made 82*l.*; ordinary descriptions, 80*l.*; ditto in ingots, 84*l.*; English tough cake, 84*l.*; and pure Corocoro minerals, 84*l.* per ton. Copper has continued quiet at Marseilles; red Toka has made 80*l.* per ton. The general aspect of the German copper markets has not experienced changes of any great consequence. Advices from Rotterdam report that Banca tin has fallen upon that market from 49 fl. to 48¾ fl. A lot of about 2000 ingots of Billiton has found purchasers at 44¾ fl. At Paris Banca, delivered at Havre or Paris, has made 89*l.*; Straits ditto, 78*l.*; and English, delivered at Havre or Rouen, 78*l.* per ton. The German tin markets have presented scarcely any appreciable change. French lead, delivered at Paris, has made 21*l.* 14s.; Spanish, delivered at Havre, 21*l.* 12s.; English ditto, 21*l.* 12s.; and Belgian or German, delivered at Paris, 21*l.* 16s. per ton. The German lead markets have been generally firm. Silesian zinc, delivered at Havre, has made 25*l.* 4s. per ton at Paris; other good marks, delivered at Havre, 24*l.* 18s.; and ditto, delivered at Paris, 24*l.* 18s. per ton. The Marseilles zinc market has remained without variation. Rolled Vieille Montagne zinc has made 32*l.* per ton. The German zinc markets have not varied.

The state of affairs remains much the same in the French coal trade. Some large contracts which were recently expected to be given out still remain unlet, and this state of affairs is not favourable to any advance in quotations. Some uneasiness is felt as to the results of the last sugar manufacturing season; there is generally an impression that it will be a bad one, but it is not known to what extent. In the Loire basin the same pre-occupations do not prevail, as metallurgical industry and exports to Italy there control the market. Metallurgy, without moving on much better, still consumes enough coal to maintain the extraction at a moderate level; on the other hand, the exportation of French coal to Italy has almost ceased for the present. The Paris coal market has continued extremely dull. A project has been brought forward for making Paris a seaport; the real object of the undertaking might more correctly, perhaps, be defined to be the improvement of the Seine between Rouen and Paris. M. Boulé has just contributed a paper upon this subject to the *Annales des Ponts et Chaussées*.

Deliveries of coal, as well by water as by railway, are declining in Belgium from day to day; several colliery proprietors have ceased working one or more of their pits. Coal contracts for the ensuing season have been generally concluded in the present month of the year, but they have not been carried through this month, as intending consumers are hoping and expecting that producers will yet reduce their demands and pretensions to some extent. Prices are, nevertheless, very low. As regards metallurgical industry, it is concluding few long-termed contracts, and foreign coal has been holding Belgian coal more than ever in check upon the Belgian markets. The annual report of the administration of the Blaton and Ath Canal states that the industrial establishments of Boom received almost all their coal last year from Prussia and England, so that the collieries of the Couchant de Mons forwarded very little coal to Broom It is feared that the present dulness in the Belgian coal trade will tinue until September or October.

The news of the week with respect to the Belgian iron trade is of comparatively little importance. The question is asked with some anxiety—"When will a revival be witnessed in Belgian metallurgical affairs?" But the answer to this problem still appears to be remote. The low price of steel has enabled the Belgian Government to considerably extend its use on railways. A hint is given that the authorities will continue to direct their attention to the question so as to secure in future some reduction in maintenance charges. If, however, the Government would boldly approach the question of metallic sleepers on the State lines the Belgian iron trade would be supplied with orders of some importance for several years to come. There is some idea of experimentally introducing the Hilf system of iron sleepers on about 31 miles of the State lines. The expenditure which this would involve, including the doubling of the way, but without account being taken of the ordinary cost of renewal, is 50,000*l.* The intentions which dictate such a policy as this are obviously good, but if the matter is relegated to commissions, sub-commissions, &c., some years may elapse before much is done. A strike has occurred at the waterpipe making works at the Vernes; some 300 men have gone out. An adjudication is about to take place at Dresden for the Saxon State railways for 12 passenger engines and four goods engines.

A letter from St. Petersburg reports the result of a recent competition for an order for locomotives for the Staumy Railway. The lowest tenders were from eleven establishments in Austria, France, Germany, and Belgium. The Creuzot works have obtained the order.

THE QUICKSILVER MINES OF NEW ALMADEN.

We have received from Mr. J. B. Randol, the manager of the company, a tabulated statement showing the details of production of the New Almaden Quicksilver Mines for 23 years and three months. As this is the most productive quicksilver mine in the United States, these carefully-kept details are very interesting. The total product of all the mines during that period was 606,453 flasks., of 76½ lbs. each, or 46,393,654½ lbs.

The Quicksilver Mines and Reduction Works of New Almaden are 15 miles south of the City of San José, Santa Clara County, California, in the Santa Cruz Mountains, at an elevation of 1750 ft. above the level of the sea. These mines were first worked for quicksilver in 1845; but the operations were on a small scale, and no record exists earlier than 1850. They have been, and are now, the most productive quicksilver mines in the world, excepting only the mine of Almaden, in Spain. They are developed to a depth of 1300 ft., and the workings extend horizontally, somewhat in the shape of the letter **Y**.

Between 500 and 600 men find steady employment, the work being actively prosecuted throughout the year. From January, 1864, to December, 1875, the number of feet of drifting and sinking on the mines of the company, as shown by the records, amounted to 129,724 ft., or 26·24 miles, at a cost of $1,000,000. This does not include the excavations made in extracting ore during the period named, nor any expenses for the same.

In 1875 there were used in the mines 2361 kegs of black powder (25 lbs. each), and 9350 lbs. of Giant and Hercules powder—the rock in most cases requiring to be drilled and blasted. At the close of the same year, about five miles of railroad, underground, were in operation, and over 2000 drifts were in active use.

The reduction works consist of nine furnaces, and include the most improved methods for working quicksilver ores; when the present improvements are finished they may be considered as most complete, and perfect in every respect. J. B. RANDOL, Manager.

Meetings of Public Companies.

WEST WHEAL TOLGUS MINING COMPANY.

A two-monthly meeting of adventurers was held at the mine, on April 13,—Mr. R. TAYLOR in the chair. The accounts showed that the labour costs for the month ending Feb. 4 amounted to 819*l.* 6s. 10d., and for the next month 897*l.* 1s. 8d. The merchants' bills were 1029*l.* 6s. 2d., and 150*l.* has been charged on account of the thirteenth month. The receipts have been, for 563 tons of copper, 3543*l.* 5s. 3d. The profit made on the two months' working was 656*l.* 10s. 7d., and a credit balance was brought down from last account of 1173*l.* 6s. 5d., making together 1829*l.* 17s. available for dividend.

The agents in their report said: The ores sold for the next two months' account realised 317*l.* This is less than usual, and the falling off has been caused by the produce of the ores being inferior to when we were taking away the richer parts of the lode in the 125 fm. level, and by a reduction in the standard at which the ores were sold during these two months, which was lower than it had been for the last 12 months. We calculate that our cost for the next two months will be less than it is at this account, but still our profit will probably be from 100*l.* to 200*l.* less than the amount which we have been lately dividing. We shall sample next week about 200 tons of ore, of which one parcel will be from the 125 level and winze, and we may calculate on an improved sampling of ore for the following month.

The accounts were passed, and a dividend of 25s. per share was declared, leaving a balance of about 1175*l.* to be carried forward to the credit of the next account.

The CHAIRMAN remarked that although it was stated in the report of the agents that the profit at the next account would be less than at present, yet that would not prevent them from declaring the usual dividend of 25s. per share, although possibly their present credit balance might be slightly reduced. After that he believed they would be able to go on as before. They would remember that at the last meeting reference was made to the desirability and justice of increasing the salary of Capt. Hancock, the managing agent. It must be admitted by all, when they remembered the great exertions he had made on behalf of the mine, that Capt. Hancock was not properly remunerated, and he was, therefore, now prepared to move that his salary be increased to 15*l.* per month.

Mr. R. TEAGUE asked why the salaries of the under agents should not be increased as well?—The CHAIRMAN replied that the under agents were differently situated from Capt. Hancock, and that they were very well satisfied with their present pay.

Mr. TEAGUE said he could not understand why it was that they had been left out. They were fairly entitled to have their salaries increased.

The CHAIRMAN had had a great deal of experience in mining matters, and he was quite sure that the under agents had no cause to complain of the amount of their present pay.

The motion for the increase of Capt. Hancock's salary was carried, and the business terminated.

WHEAL AGAR.—At a meeting, on April 13, a call of 10s. per share was made; and the appointment by the committee of management of Capt. W. Teague, jun., as agent to the mine, at a salary of 5*l.* 5s. per month, confirmed. Capt. Teague, in his report, says—"We are making very fair progress throughout the mine, and hope to complete the stamps during the next three months. I congratulate the shareholders in the greatly improved prospects of the mine since I took the management at Christmas last."

NERBUDDA COAL AND IRON COMPANY.

Some important modifications in the constitution of the company will, probably, be made at the extraordinary meetings, to be held on the same day as the forthcoming annual general meeting, the principal objects sought to be effected by the proposed alterations being the reduction and consolidation of the capital of the company, now consisting of 250,000*l.*, divided into 250,000 shares of 1*l.* each, with 8s. paid-up, to 150,000*l.*, divided into 50,000 shares of 3*l.* each, with 2*l.* paid-up. Provisions for enabling the directors to waive the forfeiture of shares, and the alteration of the qualification and disqualification of directors and their remuneration, rendering the same partly contingent upon the dividends which are paid by the company. The directors' report is very favourable, and a dividend of 5 per cent., making 7½ per cent. for the year, will be carried forward, so that when the liability is reduced by two fifths the shareholders will be in a very satisfactory position.

The output of coal for 1875 was 20,847 tons, of which 18,846 tons was sold as round and 573 tons as small coal, the remaining 1428 tons being consumed at the colliery. Mr. Manning having remained a month at the colliery, and carefully investigated everything connected with the affairs of the company, has made a valuable report to the board, in which he states that the aspect of Morambi has much improved, and that the question of labour supply need cause no anxiety in future. The working places consist at present of—the new incline up which the coal from seams Nos. 3 and 4 is raised; the workings in the bed of the river; No. 1 pit, 20 ft. deep, has been sunk down to the coal; No. 2 pit, 140 ft. in depth, has been sunk down to the coal; and the new winning, sunk about 50 ft. in depth, and the process of deepening has just been recommenced. Hitherto the coal raised has been almost entirely from seams Nos. 3 and 4, by means of the new incline, and the coal so raised has been about 70 tons per day. During the last three months the old workings of No. 1 seam, in the bed of the river, have been reopened, and the output in consequence increased to about 100 tons per day. These river workings cannot be carried on during the monsoon, and I have impressed upon Mr. Maynard the desirability of getting as much coal as possible from these sources during the fair season. The quantity of coal extracted depends almost entirely on the number of working places underground, and these are at present limited, but will be very shortly increased, when the water is pumped out of the deeper workings of Nos. 3 and 4 seams, and when the engines of pits Nos. 1 and 2 are in working order. In fact, the number of places will be increased in a ratio proportionate to the extension of workings, and with more places at which work can be done more men will be employed underground, and a greater out-turn of coal given.

Another element which must be considered when estimating the yield is the greater experience and skill which these underground workers will gain; at present they are learners, but shortly, having gained experience, they will be more efficient. Many of the older workmen have sons who are already working in the mines, and it is almost certain that they will adopt mining as the means of earning their livelihood, and eventually become very useful men. There is a diversity of opinion regarding the quality of the coal. From trials and analyses which have been made, it would appear that it is about 10 per cent. inferior to English or Australian coal, and that is borne out by answers to numerous enquiries which have been made. There are certain charges for pumping establishment, &c., which are about the same whether the output of coal per month is 1500 tons or 5000 tons, so that the question to be considered and determined is whether a further employment of machinery would not obviate the necessity of employing so many coolies. The introduction of coal-cutting machinery is the best means not only to increase the out-turn of coal, but also of rendering them more independent of the labour supply. This subject has often been discussed by the board, and the difficulty has been to find machinery that would really answer their purpose.

The directors learning in October last that Messrs. John Taylor and Sons intended sending to India Mr. George Lightly, an authority on copper mining, to report on some properties in that country, availed themselves of the opportunity to have the copper mine inspected. Mr. Lightly reports that the Berhman Copper Mine is situated in a small island, rather more than half a mile long, and a third of a mile wide, in the River Nerbudda. It hast been worked as an open cutting measuring about 100 ft. from east to west, and reaching at its deepest point about 6 fms. from the surface. Immediately eastward of the cutting the rocks, which consist of layers or beds of a kind of clay-slate and quartzose sandstone, are fully exposed at surface, while westward they dip rather rapidly beneath what is apparently the termination of one of the alluvial deposits of clay that form the corn growing plains of the Nerbudda Valley. He thinks that 40 or 50 tons of 8 or 10 per cent. ore may be extracted from the mass now at the mine. There are no smelting works on the island or elsewhere on the company's property, and it would not be worth while to go to the expense of erecting furnaces to reduce so small a quantity of ore, but if, as it is probable, other deposits should be met with in the deeper workings, the island itself, which is not under cultivation, would perhaps be the most suitable place for the erection of the necessary buildings. The distance from the Moplanee Copper Mine to the island is 38 miles—that is to say, 11 miles by branch line from Moplanee to Garrawarra, 17 miles by main line from Garrawarra to Kerali, and 10 miles by bullock road from Kerali to the island. Messrs. John Taylor and Sons state that the works by which the deposit has been laid open are not sufficiently extended to prove decidedly its true nature, but they are of opinion from the description which is given by Mr. Lightly in his report, and by the more minute particulars which they have received from him verbally, that he is right in considering it to be a true vein. They add that whether it be a true vein or not, this information may fairly be expected to afford other deposits of copper besides that which has already been seen, if its favourable indications are followed up, as many very productive copper mines have been worked in irregular deposits and pipe veins, and interstratified masses.

RIO TINTO.—The directors have issued their third annual report. It appears that from March, 1873, to December 31 the receipts (the accounts embracing the period from the commencement of the company's operations) have amounted to 2,562,628*l.*, and the balance remaining, after deducting the expenses, including interest on bonds and loans, is 81,635*l.* With regard to the development of the mines, the quantity of overburden removed during the year 1875 was 344,537 tons, the total from the beginning of the operation till the end of March being 631,887 tons. The output of pyrites during the year amounted to 112,000 tons, of which 53,000 tons were sent down to Huelva for shipment, and 59,000 to the calcining floors for calcination and cementation. Of the 53,000 tons sent down 43,000 tons were shipped, and of these 21,325 tons were delivered to purchasers. "But the operations (the report continues) of the past year, and the small profit derived from the 21,325 tons delivered, must not be taken as any indication of what the company's business will be when once in full operation, whether as regards quantity, quality, or cost. The quantity which the company is now raising exceeds 1000 tons daily, and is steadily on the increase." The precipitate sold during the year, it is added, amounting to 1432 tons, as well as 328 tons from the previous year, yielded a profit of 42,712*l.*

FOREIGN MINES.

ST. JOHN DEL REY MINING COMPANY (Limited).—Advices received April 1, 1876, ex Mondego (s.), dated Morro Velho, March 1:—

GOLD EXTRACTED TO DATE.—The produce extracted during the second division of February, a period of 10 days, amounts to 18,795·5 oits., and has been derived as follows:—

	Oits.	Tons.	Oits. per ton.
From mineral stamped	17,519·5	from 1901	= 9·215
Re-treatment	1,276·0	,, —	= ·671
Total	18,795·5	,, 1901	= 9·886

Equal to ..... 2166·8154 ozs. troy = 1·1398 oz. per ton.

The several stamps worked during this division of the month at the average rate of 23·20 hours, and reduced mineral at the rate of 190 tons per diem; this, as well as the yield of the general mineral, being a favourable increase on that of the previous month.

The general health of the establishment has suffered somewhat from the continued rains of the past two weeks. The number at present under treatment in hospital is above the average, and a few of the cases are of rather a serious character.

Advices received April 18, ex Elbe, dated Morro Velho, March 17:—

PRODUCE.—The gold extracted during the month of February amounts to 52,738·9 oits. It has been derived as follows:—

	Oits.	Tons.	Oits. per ton.
From mineral stamped	48,549·5	from 5451	= 8·925
Killas	25·0	,, 144	= 1·736
Total	48,799·8	,, 5595	= 8·722
Re treatment	3,939·1	,, —	= ·704
Total	52,738·9	,, 5595	= 9·426

Equal to 6079·9372 ozs. troy = 1·0866 oz. troy per ton.

The produce for this month is about the same as that for January, but this being a shorter month the average yield per diem shows a favourable increase, being 82·5 oits. better than obtained in that month.

COST AND PROFIT.

The produce being	52,738·9 oits.	
Deduct loss in melting	319·5 ,,	
	52,419·4, at 7s. 9d. per oit. =	£20,312 19 4
Cost		7,0 4 19 6
Profit		£13,297 10 10

MINE DEPARTMENT.—Since I had the honour of addressing you on the 1st inst. some trifling but annoying interruptions to our hauling operations have occurred, and interfered to some extent with the regular output of mineral, nevertheless very good duty has been performed in this as well as in sinking, stoping, driving, and other operations conducted in the mine.

REDUCTION DEPARTMENT.—You will observe from the returns that go forward by this opportunity that a very large amount of duty has been performed by the stamping mills, arrastras, and amalgamation machinery during the month of February. A full stream of water was brought on to the establishment throughout the month, and we were, therefore, able to keep the mills going at a regular rate of speed.

The total amounts of mineral treated and sand amalgamated are rather less than those of the previous month, but this being a shorter month the averages per diem are nearly the same, that of the former being slightly under and of the latter a little above the rate of duty performed in January.

The loss of quicksilver is this month more favourable, being only 197 lbs.

GOLD EXTRACTED TO DATE.—The produce extracted during the first division of March, a period of ten days, amounts to 17,787·5 oits., and has been derived as follows:—

	Oits.	Tons.	Oits. per ton.
From general mineral	16,570·0	from 1904	= 8·702
Re treatment	1,217·5	,, —	= ·639
Total	17,787·5	,, 1904	= 9·341

Equal to ..... 2040·5797 ozs. troy = 1·0717 oz. per ton.

The mills were driven at a slower rate of speed, owing to the supply of mineral from the shafts not being quite equal to their requirements during the above-named period, and they did not, therefore, perform so good duty as in the preceding division.

The health of the establishment continues rather unfavourable, the number of cases under treatment being still considerably above the average.

The following telegrams have been received:—

On March 23: Produce 10 days (first division of March), 17,750 oits.; yield, 9·1 oits. per ton; profit for the month (February), 13,200*l.*

March 31: Produce 11 days (second division of March), 18,000 oits.; yield, 9·0 oits. per ton.

April 11: Produce for the month (March), 52,500 oits.; yield, 9·1 oits. per ton.

April 19: Produce eight days (first division of April), 12,250 oits.=4747*l.*; yield, 8·6 oits. per ton.

EXCHEQUER (Gold and Silver).—Mr. Chalmers writes (March 27):—"The engine-shaft is now down 323 ft. The spur of ledge matter still continues, and widens in the bottom. The north drift at the 200 is driven 407 ft. Will cross-cut next week when Hay's contract is finished. Commenced stoping at the 300 ft. level, 50 ft. north from cross-cut; the lode is 5 ft. wide, and some fine ore in sight. Two men broke four carloads of ore in two days, which all went on top. The cross-cut east, from the 40 winze, is 28 ft. long, and still in lode: no hanging-wall yet. At 22 ft. struck quartz showing free gold. The Acacia contractors (for 100 ft. at £10 per foot) are running on what appears to me to be a feeder, and not the vein proper; I shall cross-cut to find out.—The Mill: My millmen arrived on foot on Wednesday. Regular running commenced to-day. Everything works well."

BENSBERG.—C. Craze, April 17: Victoria Shaft: The water is still so quick here that we have not been able to fork to the bottom of this shaft, although the engine has been going about 18 strokes per minute for all the past week, with pit-work working well, and in good condition. The Chairman and Mr. Ashton were here on Saturday last, and we have decided to fix the Hayward Tyler pump in the shafts, to assist in forking the mine; this we will do with all possible speed. No change in the east and west ends, in the 14, since my last report.

[For remainder of Foreign Mines, see to-day's Journal.]

THE CARIBOU MINE.—The "Financial Reporter," of Amsterdam, devotes considerable space to a proposal made by Mr. Frank Sherwin, of San Francisco, to the shareholders of the Caribou Mine. We are credibly informed that Mr. Sherwin represents Mr. M. Anker, and the other American shareholders, and we hope the negociations may result in a speedy resumption of mining on the Caribou. As the management will then be in the hands of Mr. Anker, a practical and economical system of mining will consequently be carried out, and success to the shareholders will be an assured fact.—*Rocky Mountain Herald* (Denver, March 28).

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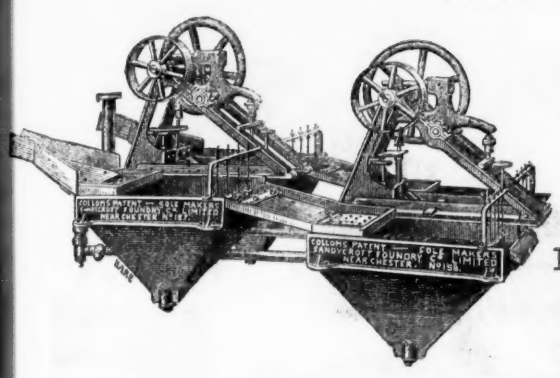

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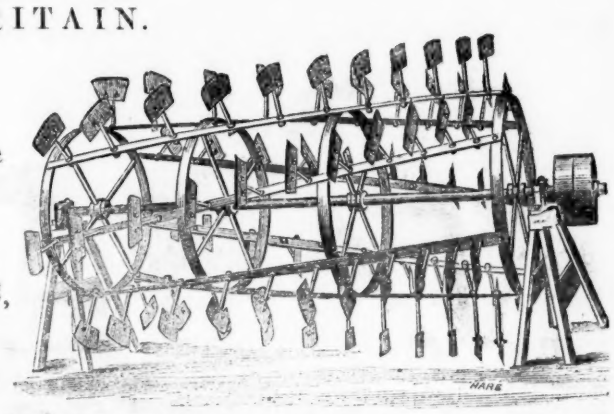

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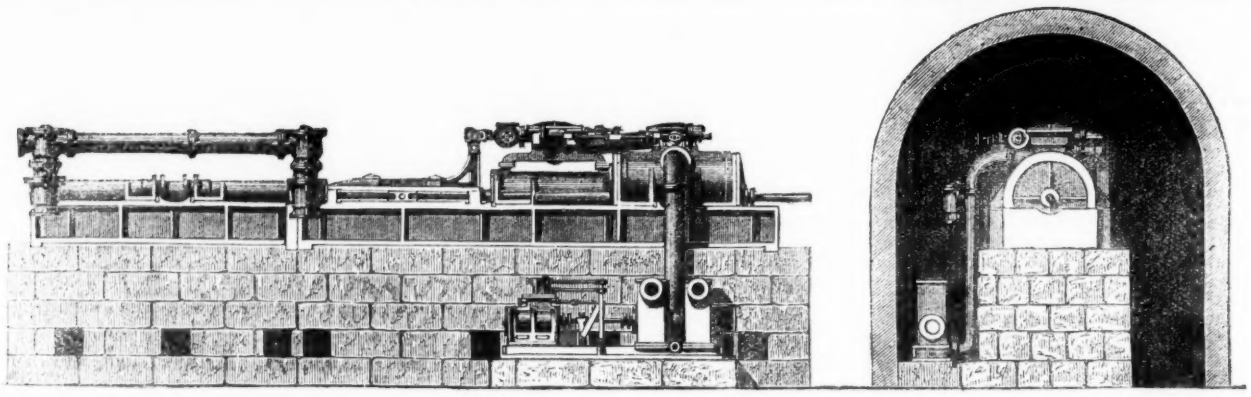

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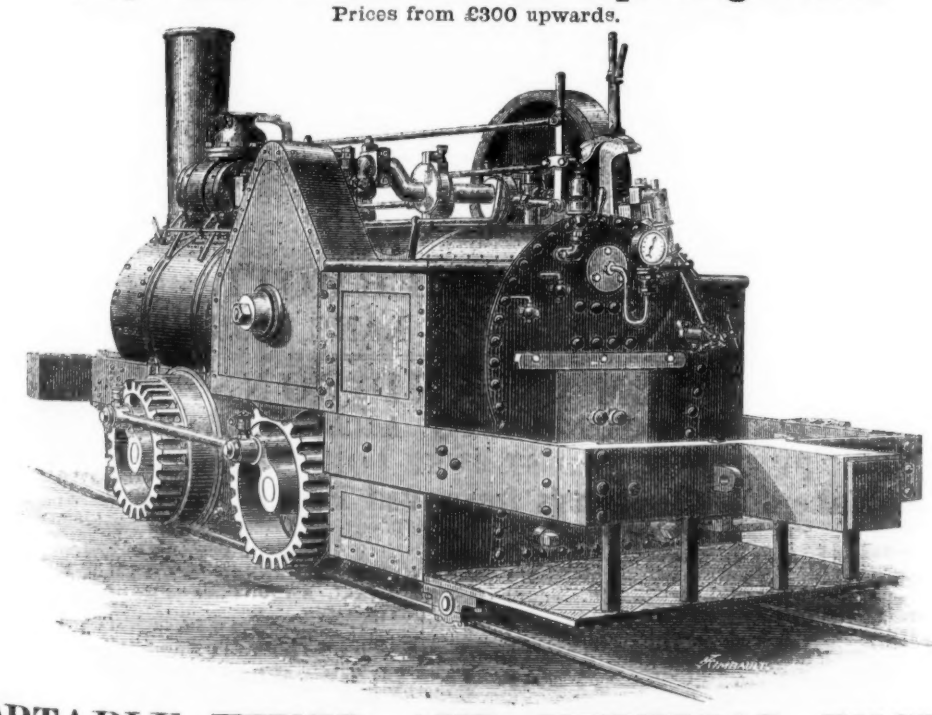

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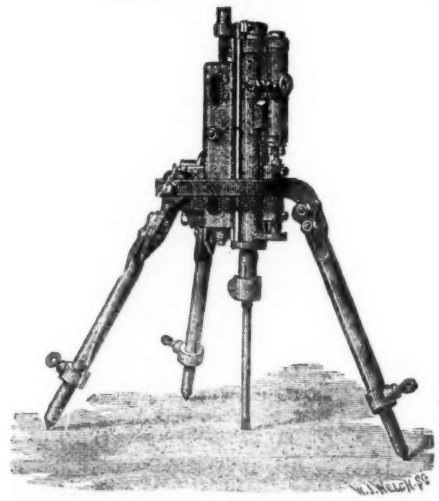

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